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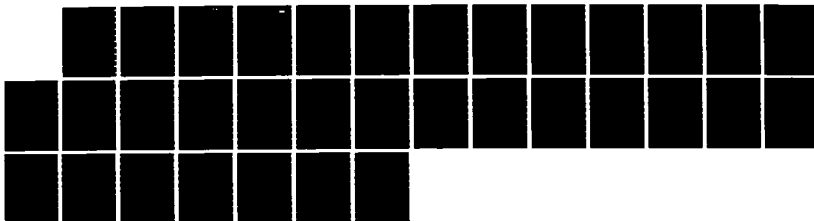
IMPLEMENTING THE INDUSTRIAL MODERNIZATION INCENTIVES  
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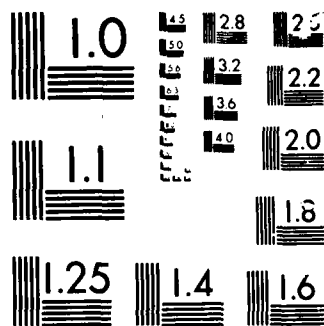
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IMPLEMENTING THE INDUSTRIAL  
MODERNIZATION INCENTIVES PROGRAM

February 1986

Geneese Gottschalk  
Paul R. McClenon

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## Executive Summary

### IMPLEMENTING THE INDUSTRIAL MODERNIZATION INCENTIVES PROGRAM

Defense contractors have often been reluctant to make significant investments in modern, more efficient equipment that could lower costs for weapons systems. They have been inhibited primarily by the Department of Defense's (DoD's) profit policy under which lower costs lead to lower profits on future negotiated contracts. They have also been inhibited by the risk of unexpected program termination which would prevent full recovery of investment costs. Thus, DoD needs to improve its means of motivating contractors to make cost-reducing investments.

A recent initiative to do so is the Industrial Modernization Incentives Program (IMIP), a DoD-wide effort to provide incentives to invest in modern capital equipment by allowing contractors to retain a share of productivity-induced cost savings. In 1985 DoD concluded a test of the IMIP in which it offered contractors financial incentives and investment protection in case of unexpected program termination. DoD also used the test to determine how IMIP affects and is affected by such issues as competitiveness of the defense marketplace and the potential for payment of inappropriate rewards to contractors. During the test, we developed a discounted cash flow (DCF) model for use in analysis of the financial effects of proposed IMIP agreements. We also evaluated the IMIP test.

We conclude that the IMIP can substantially reduce the costs of DoD's acquisition programs. Since the inception of the test, however, the focus on cost reduction through capital investment has been expanded by the addition of other objectives (e.g., enhancement of production surge potential) and applications (e.g., noncapital projects). We believe that DoD should apply IMIP incentives only in those cases in which price competition is absent and that it should keep contractual implementation as simple as possible, consistent with the need to minimize the risk that it will pay unearned rewards. Finally, we conclude that the DCF model is the appropriate financial analysis tool for IMIP.

We recommend that:

- DoD policy should emphasize cost reduction through capital investment as the primary objective of the IMIP. Collateral benefits such as enhanced production surge and mobilization potential are desirable, but giving them the status of equivalent objectives dilutes IMIP's purpose and thus reduces its potential for substantially reducing DoD acquisition costs.
- DoD policy should limit IMIP to cases where price competition is not feasible and keep contractual implementation simple; to avoid payment of unearned rewards, DoD should carefully project the likely outcomes of each IMIP agreement.
- DoD contracting officers should continue to use the DCF model developed during the test to support the drafting of shared savings agreements. The Assistant Secretary of Defense (Acquisition and Logistics) should appoint a Military Service as executive agent to maintain the model so that it reflects current DoD contract pricing and federal tax policy. The executive agent should provide technical assistance to model users.

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## 1. INTRODUCTION

### THE PROBLEM

Defense contractors have traditionally been reluctant to make investments in cost-reducing, productivity-enhancing capital equipment. Among the reasons for this reluctance is the often erratic nature of demand for their products. Changes in the perception of the threat, budgetary fluctuations, and other elements of the political process that establish defense budgets often result in extending programs, reducing quantity, and occasionally even in terminating programs. Another factor, however, is the Department of Defense (DoD) profit policy for negotiated contracts. Under that policy, a contractor's profits are largely based on costs expected to be incurred. A contractor who cuts cost through productivity enhancement may benefit on a current fixed-price contract but will subsequently lose since future contract prices are negotiated on the basis of the new, lower level of cost.

### EARLIER ATTEMPTED REMEDIES

These problems have long been recognized, and over the years, DoD officials have searched for techniques to ameliorate the situation. Increasing program stability is a prominent feature of the Acquisition Improvement Program (AIP) begun under the auspices of former Deputy Secretary of Defense Carlucci. While some improvements have been achieved, it remains questionable how thorough or permanent those improvements will be in an environment of relatively less generous defense budgets and continued active Congressional involvement in programmatic decision-making.

For years the weighted guidelines profit policy [Defense Acquisition Regulations (DAR) 3-808.2] has included provisions for productivity rewards designed to mitigate the loss of profit that occurs when costs are reduced by increased productivity. These provisions have not been used very often. Productivity rewards have been available only for follow-on production contracts for which the actual cost history provides a reliable cost baseline. Even in such cases it has been difficult to separate the cost reduction attributable to productivity gains from that resulting from other



changes, such as those in the configuration of the product. The limited applicability has not added much to the financial attractiveness of productivity enhancements.

In addition, investments in facilities, whether productivity-enhancing or not, were financially unattractive until 1976. One of the major DoD policy changes made as a result of the "Profit '76" study was the provision for a significant recognition of the contractor's investment in facilities as a part of the pricing process. This important contracting change has reduced the previous financial disadvantage associated with contractor investments. New investments in facilities now give rise to increases in recognized cost and in profit. The change, although helpful, does not discriminate among investments; an investment that does not result in lower cost is, even now, more attractive to the contractor than one that does reduce costs.

In 1978 the U.S. Air Force, recognizing the need for special rewards to induce desirable investments, developed a program called "Tech Mod," for technology modernization. The essential idea is not unlike that of the productivity reward provided in the weighted guidelines policy, but under Tech Mod, the contractor and the Air Force actively searched for mutually beneficial investments and savings. Tech Mod based its reward on a financial analysis of the discounted cash flow (DCF) associated with the investment. Under the Tech Mod program the Air Force negotiated agreements with several major contractors, agreements which included attractive profit expectations to the contractor and attractive improvements in production facilities as well as major reductions in contract prices.

#### THE INDUSTRIAL MODERNIZATION INCENTIVES PROGRAM (IMIP) REMEDY

In 1982 Deputy Secretary Carlucci decided to examine the applicability of Tech Mod concepts to the entire DoD. He chartered a test of these concepts under the name of the IMIP. The test was monitored by a steering group composed of flag or equivalent rank officers for each of the Military Services, the Office of the Secretary of Defense, Defense Logistics Agency, Defense Contract Audit Agency, and, subsequently, the National Aeronautics and Space Administration. The steering group was supported by a working group consisting of several representatives from each Service or agency represented on the steering group.

The objectives of the test were to try alternative contractual approaches to implementing IMIP, to develop financial analysis tools, and to address a series of issues (e.g., interaction of IMIP with other contractual incentives) raised by Deputy Secretary Carlucci in his charter of the test.<sup>1</sup>

The test was concluded in mid-1985, at which time more than 100 firms had become involved in IMIP. The Air Force had 47 IMIPs with 89 contractors at 113 plants in some stage of implementation, the Navy had 14 IMIPs with 13 different companies, and Army participation was limited. Although anticipated IMIP savings are in the billions of dollars, few IMIP efforts have reached the phase in which savings are actually being realized.

During the test much was learned, but because the process of factory modernization is often quite long, more information must be available before any definitive assessments are made regarding most of the issues raised by Secretary Carlucci.

In this report, we describe the results of the test to date, discuss what conclusions we draw from them, and make recommendations for the future conduct of the program.

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<sup>1</sup>A copy of the charter is presented in Appendix A.

## 2. CONDUCT OF THE TEST

### CONTRACTUAL IMPLEMENTATION

The IMIP is implemented through two primary approaches – contractor investment protection and financial incentives, or shared savings, known as productivity savings rewards (PSRs). Other implementation techniques are also permitted but their application was limited during the IMIP test.

#### Contractor Investment Protection

To hedge against the risks of unexpected program termination or quantity reduction, IMIP can provide contractor investment protection. During the test, some programs provided contractor investment protection while others did not. For example, because the F-16 program involves delivery of a large quantity over a long period of time in circumstances where early termination could not readily be offset by other business, the Air Force and General Dynamics agreed that the company should have some special protection against the unlikely occurrence of these events.<sup>1</sup>

The contract contains requirements for notice by the procurement contracting officer that the Air Force plans no more F-16 purchases within 30 days after any of these possible events: (1) three consecutive years of no appropriations for F-16 aircraft, (2) three consecutive years during which no F-16 sales have been made to European Participating Governments (EPG) or other foreign military services, or (3) notification of termination for convenience.

Upon receipt of such a notice, General Dynamics has 90 days to decide what, if any, of the equipment that it has acquired to that point, as a result of the Tech Mod, it might wish to retain. The balance of the equipment would be acquired by the Government according to a sliding scale based on the number of aircraft actually acquired.

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<sup>1</sup>Despite the fact that it was begun before the official start of the IMIP test, the F-16 Tech Mod is considered part of it.

At the time the Air Force/General Dynamics agreement was negotiated, the Air Force had termination protection obligations for any quantity less than 1,388 aircraft. Since more than 1,388 F-16's are already under contract, the provision has become moot. Had it been exercised, however, the Government's obligation would have been computed by multiplying the undepreciated capitalized acquisition cost (i.e., the remaining book value) of a particular piece of equipment at the time it reverted to the Government by a percentage (see Table 2-1) determined by the quantity of aircraft. Any investment tax credit already paid or still owed by the U.S. Treasury would then be subtracted to determine the net acquisition price.

**TABLE 2-1. TERMINATION  
PROTECTION SCALE<sup>1</sup>**

PROCURED	PERCENT FACTOR
1 - 90	98
91 - 310	95
311 - 592	90
593 - 893	85
894 - 1388	80

<sup>1</sup>Adapted from Contract F33657-82-C-2034 Draft, p. 11.

The negotiation of percentage factors less than 100 percent of remaining book value may have resulted in some risk being shifted to the contractor. However, since the market value of a piece of used equipment is typically greater than its remaining book value, General Dynamics had the opportunity to get a better price from a non-DoD customer. As a practical matter, the stability of the F-16 Program, because of EPG participation, made exercise of these provisions a very low probability event.

The Navy's IMIP with the Grumman Aerospace Corporation represents a different approach to the issue of contractor investment protection. Because that IMIP affects five different aircraft programs (A-6, F-14, E-2, EA-6B, and C-2), neither Grumman nor the Navy believed that termination protection was required. The diversity of the business base suggested that even if

one program was terminated or changed substantially, those remaining would be sufficient to support the modernization effort.

### Financial Incentives

The second element of IMIP contractual implementation is the provision for payment of a PSR to offset the effects of reduced profits on future contracts. In general, the amount of PSR is negotiated between the Government and the contractor after each has analyzed the financial effects of the proposed investment, with and without any PSR. From the contractor's perspective, the important consideration is the changes in cash flow that will result from the investment. In Government contracting, the elements of cash flow arising from new contractor investments are the following:

#### Inflows:

- Annual imputed cost of money based on the remaining book value of the proposed investment in equipment, as provided by Cost Accounting Standard (CAS) 414 and Federal Acquisition Regulation (FAR) 31.205-10(a);
- Annual depreciation on the proposed investment (because depreciation is an allowable contract cost under CAS 409 and FAR 31.205-11);
- Net change in profit (increase or decrease) – representing the effect of the proposed investment on the profit component of price; consisting of profit on depreciation, profit from the weighted guidelines facilities capital component, and any reduced profit due to lower contractor costs;
- Any PSR.

#### Outflows:

- Contractor facilities investment expenditures;
- Contractor income taxes resulting from higher taxable income – reduced by any additional investment tax credit for capital investments.

From a DoD perspective, the important factor in determining the PSR is the cost/benefit profile, i.e., the annual net cost reduction from lowered contract prices. From this amount, DoD subtracts any DoD funding and proposed PSR to determine its net benefit (or cost, if negative).

Role of Discounted Cash Flow Analysis. During the test, it became apparent that DoD's contracting officers and others involved in IMIP needed financial analysis tools to evaluate the

combined effects of these changing cash flows on the need for PSR. The working group, representatives of field activities, and the Logistics Management Institute concluded that DCF analysis was the appropriate analytical tool.

DCF analysis considers the magnitude and timing of all effects on the cash flow arising from a contractor's investment. It is *incremental* in that it takes into account only additional contractor cash flows attributable to the proposed investment in new facilities. Items of cash inflow and outflow are not only quantified in magnitude, but their timing is also considered through discounting. This technique reflects the fact that a dollar of immediate positive cash inflow is of more value than one due in the future. An after-tax stream of cash inflows and outflows is summarized by a single number, the internal rate of return (IRR). The IRR is precisely the discount rate that makes the present value of all cash inflows equal to the present value of all cash outflows. The IRR provides a basis for comparison with other investment alternatives and the contractor's investment "hurdle rate." During the IMIP test, target IRRs ranged from about 15 to 40 percent.

The elements of the DCF model are reproduced as Table 2-2. It has been automated for use on a personal computer with a spreadsheet financial analysis program.<sup>2</sup>

Design of PSR Payment Plans. Once the amount and schedule of payment for the PSR have been negotiated using DCF analysis, many ways are available to provide for its payment contractually.

In the case of the F-16 programs, for example, the payment of incentives is linked to the timely purchase of new equipment, implementation of related technologies, and achievement of projected savings associated with individual packages or groups of equipment and technologies. The performance incentive was structured to reward the contractor for both the intention to achieve goals and the actual achievement of these goals; the Air Force structured the incentive so that 30 percent is based on the contractor's performance in implementing new facilities to a planned schedule,

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<sup>2</sup>See Myers, *et. al.*, "Discounted Cash Flow Model for the Industrial Modernization Incentives Program," Logistics Management Institute, November 1985, RE301-4.

TABLE 2-2. DISCOUNTED CASH FLOW MODEL

Year:		1986	1987	1988	1989
		1	2	3	4
<b>SECTION I. CORE DATA</b>					
1 Contractor Investment		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
2 Contractor Expenses		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
3 DoD/Government Funding		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
4 Savings Available to DoD		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
<b>SECTION II. INCREMENTAL CASH FLOWS</b>					
5 Productivity Savings Reward		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
6 Cost of Money (CAS 414)	xx.xx%	0.0	0.0	0.0	0.0
7 CAS 409 Depreciation		0.0	0.0	0.0	0.0
8 Profit Effect		(0.0)	(0.0)	(0.0)	(0.0)
9 Subtotal: DoD Cash Flows to Contractor		0.0	0.0	0.0	0.0
10 Salvage Value		0.0	0.0	0.0	0.0
11 Contractor Before-Tax Cash Flow		0.0	0.0	0.0	0.0
<b>SECTION III. TAX CALCULATIONS</b>					
12 ACRS Depreciation		0.0	0.0	0.0	0.0
13 Contractor Taxable Income		0.0	0.0	0.0	0.0
14 Contractor Income Tax	yy%	0.0	0.0	0.0	0.0
15 Investment Tax Credit	zz%	0.0	0.0	0.0	0.0
16 Contractor After-Tax Cash Flow		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
<b>SECTION IV. SUMMARY</b>					
17 DoD Program Benefit (Without Incentive)		0.0	0.0	0.0	0.0
Cumulative Total	0	0.0	0.0	0.0	0.0
18 DoD Program Benefit (With Incentive)		0.0	0.0	0.0	0.0
Cumulative Total	0	0.0	0.0	0.0	0.0
19 DoD Payback Period	0.0 years				
20 Government Benefit		0.0	0.0	0.0	0.0
Cumulative Total		0.0	0.0	0.0	0.0
21 Government Payback Period	0.0 years				
22 Contractor Internal Rate of Return	(Condition)				
Without Incentive	0.0% (1)				
With Incentive	0.0% (1)				
(IRR Conditions: 1-Unique positive IRR; 2-No positive IRR;					
3-Infinite IRR; 4-Possible multiple IRRs)					
23 Contractor Payback Period	0.0 years				

30 percent is based on the implementation of enabling technologies to the planned schedule, and 40 percent is based on the achievement of predicted savings. In Appendix B, we describe how performance incentive payments are calculated for General Dynamics in all three categories.

The Navy IMIP agreement with Grumman is less complicated. Grumman and the Navy agreed to share savings on a 50-50 basis, subject to two conditions. First, Grumman will share for a maximum of 5 and a minimum of 2 years on any given project. Second, if Grumman's share of the savings within the first 5 years would provide an IRR in excess of 26 percent as measured by the DCF

model, that share will be reduced enough so that it will yield the agreed 26 percent. If Grumman can achieve savings so rapidly that an IRR greater than 26 percent would be earned in the first 2 years, it would be allowed to achieve the higher IRR, but all sharing would end at the end of the second year. Thus, the overall objectives of the agreement are to provide Grumman with a 26 percent IRR, to limit sharing to no more than 5 years, and to provide the possibility of extra rewards for very rapid achievement of savings.

These savings sharing provisions with Grumman are applicable to fixed-price contracts only. For firm-fixed-price contracts, the contract price is reduced by 100 percent of the expected cost savings and a new fixed-price line item is to be added for Grumman's share of the expected savings. For fixed-price incentive contracts, the ceiling price and target cost and price are reduced by the amount of the savings and a separate firm-fixed-price line item is inserted to provide Grumman its share of the savings.

#### Other Incentives

Incentives other than contractor investment protection and shared savings may also be used to encourage productivity-enhancing investments. In the F-16 Tech Mod, the Air Force has also provided for award fees. The Air Force believed that the Tech Mod procedure, as a new way of doing business, needed high-level management attention within General Dynamics and that provision for an award fee would attract that attention. For award fee determination, performance is reviewed annually. Criteria such as ingenuity of project design and success of program management influence the size of the fee (that can be as great as \$1 million annually). More recently, an important determining criterion has become General Dynamics' progress in implementing its Industrial Technology Modernization (ITM) program. The ITM program involves the use of IMIP concepts and techniques to encourage reduced prices in subcontracts. General Dynamics plans to apply the ITM to at least 60 subcontractors and vendors.

Another approach to implementation developed during the test is the sharing factor, which is essentially a special cost element on individual programs to provide a PSR when a large number of contracts are affected by the modernization. Individual contracts would pay their share of



PSR proportionate to their share of the savings. This approach is particularly useful for contractors and subcontractors who are involved in several different programs with different customers.

#### CONSIDERATION OF THE CARLUCCI ISSUES

The following 14 qualitative issues raised by Deputy Secretary Carlucci in the IMIP Charter were considered during the test:

- Development of different incentives appropriate for various contractual situations; i.e., contract size (large and small contracts), contract types (fixed price versus cost), and degree of competition.
- Ways to ensure that incentive provisions can be successfully employed to encourage investments by subcontractors and vendors.
- Means for applying incentives to other-than-single contracts, such as when numerous DoD Component contracts and different DoD Component contracting activities deal with a single contractor.
- The manner in which incentive clauses can be applied to nonseverable assets and real property.
- Development of verifiable evaluation criteria for measuring contract performance, including validating cost savings and other benefits.
- Assessment of how the use of these incentives affects competition. (Does DoD provide an undue competitive advantage to selected contractors? Can competitive solicitations be structured to permit alternative proposals based on use of these incentives?).
- Determination of whether these incentives will measurably reduce unit production prices to DoD in acquisition programs.
- Evaluation of whether contractor investment in capital assets (facilities, equipment, and associated data or computer software) needed for the defense industrial base will increase through the use of these incentives.
- Determination of how the increased production efficiency aspects of proposals can be separated from possible increased production capacity for proper evaluation.
- Assessment of the unintended or unforeseen effects of the utilization of these provisions.
- Assessment of the relationship between the weighted guidelines (DAR 3-808.2) and the new incentives (What changes and adjustments, if any, will be necessary to the weighted guidelines?).

- Evaluation of the combination of contractor investment protection and shared saving type incentives and their interaction with other incentives such as Value Engineering and Design-to-Cost.
- Identification of incentives to improve productivity in areas other than through capital investment (e.g., human resources, overhead, inventory, and product design).
- Candid evaluation of the success of various incentives and the overall program.

In Chapter 3, we discuss some of the test findings and conclusions related to these issues.

### 3. FINDINGS AND CONCLUSIONS

Experience with IMIP is too limited to support drawing many definitive conclusions, particularly with respect to many of the 14 issues raised by Deputy Secretary Carlucci. However, in some cases we can be more certain in our assessment.

#### IMIP AND COST REDUCTION

First, the test demonstrated that IMIP has the potential to reduce DoD's acquisition costs substantially. Unlike the investment-related elements of the weighted guidelines profit policy, IMIP distinguishes among investments for their contribution to productivity enhancement and cost reduction. It provides the best rewards for the best investments. However, as the test progressed, this original objective of supporting AIP Initiative No. 5, "Encourage Capital Investment to Enhance Productivity," has been somewhat diluted. Some proponents of IMIP now seem to believe that other objectives such as adequate production surge and mobilization potential have equivalent status. Others believe that the enhancement of product quality, even when it cannot be related to reduced acquisition costs, is at least as important an objective. While those objectives may indeed be worthwhile, they are only collateral benefits of IMIP. IMIP was established primarily to provide cost reductions in DoD acquisitions, and other programs deal more effectively with those other objectives. Emphasizing them tends to reduce the potential of the IMIP program for substantially reducing DoD acquisition costs.

Modernization efficiency projects (MEPs) are those that enhance productivity through means that are not capital intensive. Their inclusion as candidates for incentives under IMIP is additional evidence that the focus of the program has shifted away from cost reduction through capital investment. The addition of MEPs also raises the issue of how savings can be measured and appropriate PSRs determined since DCF is not the appropriate analytical tool for programs in which little or no capital investment is being made. The exact kinds of projects that would be appropriate for MEP incentives is difficult to define. Factory floor rearrangement is a possibility, but it is difficult

to identify costs associated with it that are not already allowable under existing cost and pricing policy. Furthermore, existing approaches to pricing production contracts (i.e., fixed-price incentive and firm-fixed price) should motivate contractors to implement good ideas for cost saving by allowing them to keep current contract savings.

During the test, the working group considered using alternatives to DCF analysis as a basis for negotiating PSRs because of the perceived complexity of DCF analysis. The alternatives ranged from simplifying the DCF model by not taking full account of all incremental cost and profit changes arising from an investment to the use of fixed percentage savings shares. As a practical matter, however, the only way for a Government negotiator to measure and evaluate the investment-related payments that occur without any PSR is to consider incremental changes. Less-than-complete evaluation (or none at all with arbitrary sharing percentage provisions) may result in the contractor receiving an IRR higher than is really needed to encourage the investment.

Thus, although DCF analysis requires some data collection and preliminary calculations, it is the appropriate financial analysis tool for IMIP. Discussions about the appropriateness, complexity, etc., of DCF analysis do raise the issues of DoD users' needs for technical assistance and, in the case of a DCF model, access to an up-to-date version that reflects current DoD contract pricing and Federal tax policy. These legitimate concerns should be addressed by DoD as part of full-scale implementation of the IMIP program.

#### CONTRACTUAL IMPLEMENTATION

As demonstrated in the specific Air Force and Navy programs cited, approaches to contractual implementation of IMIP can be quite complex. We conclude that complicated arrangements for implementing PSR payment plans and providing for savings tracking and verification may be necessary, particularly in cases where savings estimates and proposed PSRs are very large. Administrative costs, however, must be considered in determining the net savings. In many cases, both DoD and its contractors may want to simplify the administrative burden and avoid the cost of tracking and verification. In return for not having to prove conclusively that savings have actually been achieved as estimated, contractors may be willing to accept relatively modest PSRs. Such an

approach may occasionally result in the payment of unearned PSR, but DoD should be willing to take that risk in return for the easing of administrative requirements and, more importantly, IRRs that are substantially lower than most of those negotiated during the test.

### THE CARLUCCI ISSUES

The test yielded some insight into a number of the issues raised by Deputy Secretary Carlucci. These are summarized in the following subsections.

#### Contractual Incentives

To date, it appears that the contractual incentives (i.e., PSR determined by return on investment analysis and contractor investment protection) are sufficient to permit implementation of IMIP in a wide variety of contractual circumstances. The flexibility remains to use award fees and to emphasize the weighted guidelines special productivity factor.

Conceptually, these incentives are adequate to be used with subcontractors and vendors and in circumstances where more than one program and DoD buying component are affected. The sharing factor is one way of assigning pro rata shares of PSR payment among a number of benefiting programs. In practice, however, widespread application of this technique may prove to be a difficult process. The more programs and Services involved, the more agreements (Memoranda of Understanding) that have to be reached to get the IMIP underway. Individual program managers may have the incentive to reap the full benefit of the cost reduction while someone else's program pays the "tax" of the PSR. The single program, single facility (as in the General Dynamics Tech Mod) presents the fewest implementation problems. Arranging for the application of IMIP incentives when many programs and all the Services are involved will require a strong commitment on the part of the Services and program offices.

For example, during the test period the Services publicized the program to the subcontractor and vendor tiers of the industrial base. They encouraged and sometimes required prime contractors to involve their subcontractors in IMIP programs and also developed the sharing factor for contractual implementation. Such active involvement will have to be continued if IMIP is to be widely applied to the lower tiers of the industrial base.

### Nonseverable Assets and Real Property

In general, the Services have continued to believe that nonseverable assets and real property are not appropriate for IMIP incentives. Contractors are required by existing regulations to acquire the real property needed to perform their defense contracts. Substantial rewards already exist under CAS 409 and 414 and the current profit policy. In the case of real property, particularly land, useful life is very long and connecting it to changes on any particular contract for which incentives might be considered is very difficult. Furthermore, it is conceptually much easier to associate improvements in productivity with the use of severable equipment, new manufacturing processes, etc.

Notwithstanding all of the above, it is possible to envision circumstances (e.g., a special facility for productivity-enhancing spray painting equipment) where nonseverable assets might be appropriate for an IMIP incentive. Therefore, the flexibility should be retained to allow IMIP deals for such assets when appropriate.

### Validating Cost Savings

Both DoD and industry participants in the IMIP test identified ways to measure actual IMIP savings. Programs such as the F-16 Tech Mod developed sophisticated computerized cost tracking systems to measure Tech Mod-related changes. In other cases, however, managers expressed concern over the costs and complexity of after-the-fact tracking and chose to rely on trying to verify the accuracy of cost change *estimates* rather than actual savings. In addition, alternative approaches to determining savings shares (PSRs) were occasionally discussed. These alternatives ranged from the development and use of simplified forms of the DCF model to reliance on predetermined savings sharing percentages as in the case of Value Engineering.

After-the-fact validation of cost savings has been accomplished in some programs. Typically, it has involved automated tracking systems that compare "before" and "after" costs of highly disaggregated elements of the manufacturing process, usually changes in direct labor hours. Changes in material acquisition costs can also be tracked with relative ease. Tracking is more

difficult, however, when indirect costs are involved or when the effects of large numbers of other programmatic changes must be factored out to isolate the effects of IMIP.

Even though most validation schemes are carried out on a sampling basis, the administrative costs can be very high. Careful attention should be given to balancing the costs and benefits of complex verification systems. In some cases, the Government may be wise to agree to minimal validation in return for paying the contractor a smaller PSR.

#### IMIP and Competition

Competition was also considered during the test. Deputy Secretary Carlucci wanted to understand how the competitiveness of the defense marketplace would affect and be affected by IMIP. Most applications of IMIP during the test focused on areas in which competitive forces are not a major factor. Large, sole-source airframe contracts are typical examples. In other cases (e.g., electronics component and subsystem manufacturers), the degree to which competition would have encouraged investment was less clear. In some limited number of cases, IMIP is even being contemplated for use in entire industries where prices are much more determined by the market and where individual firms do not even provide DoD customers with cost and pricing data. Here, the intent (as in the case of the forging industry) seems to be to enhance surge production potential and product quality more than to reduce costs.

Contractors who participate in IMIP and acquire modern, efficient facilities surely enhance their competitive position in the DoD marketplace. However, it does not seem reasonable to conclude that IMIP participants derive an unfair competitive advantage. For example, by the time the Air Force chooses a contractor for its next generation of fighter aircraft, it is unlikely that General Dynamics participation in Tech Mod would be the decisive factor in a source selection. All its competitors will have had an opportunity to modernize either through IMIP or independently.

The other question regarding IMIP and competition has to do with the appropriateness of its application in a highly price-competitive environment. We conclude that the discipline of price competition, when it exists, should be adequate to motivate cost-reducing investments without any need for additional incentives. DoD is increasing its use of competition through dual sourcing which

is not highly price competitive. The high-cost source is awarded the smaller share of the annual buy. IMIP may still be appropriate in the case of dual sourcing because the full effect of market forces is diluted through award splitting.

#### Unit Production Price Changes

Since IMIP incentives are clearly a device to offset the effects of cost-based profit policy, they should have a substantial effect in achieving reductions in unit production costs.

#### Investment in Capital Assets

Since the policy changes made as a result of the DoD's "Profit '76" study and the further revisions introduced by Defense Acquisition Circular No. 76-23 in 1980, the level of contractor investment in capital assets has increased substantially. Part of the increase is a consequence of those changes; part of it is a response to a steadily expanding volume of business. IMIP's contribution to these increases should be to direct incremental investment to those areas that are most productive for DoD.

#### Production Efficiency vs. Capacity Expansion

In general, the objective of IMIP is to enhance efficiency, not to expand capacity. However, in some cases, it may be impossible to completely distinguish between the two. It is likely that in most cases implementation of an IMIP may have some collateral effect of capacity expansion.

#### Relationship to Weighted Guidelines

As long as the weighted guidelines profit policy does not distinguish among investments for their contribution to productivity enhancement, IMIP incentives will continue to be the "off-line" mechanism available to DoD to encourage contractors to choose cost-reducing investments. If a rational scheme could be developed, some productivity measure of merit could be built into the weighted guidelines. The important thing about the existing weighted guidelines is that the rewards they already provide for investment should be fully recognized as part of the process for determining whether an IMIP incentive is necessary, and, if so, how much.



### Interaction of Incentives

Since neither the Value Engineering nor the Design-to-Cost program emphasizes capital investment, it is relatively easy to distinguish the various incentive programs. An additional distinction is the emphasis in Value Engineering and Design-to-Cost on product specification changes to achieve cost reduction. However, it will become less clear if contractors are permitted to "game" multiple incentives in the same contract.

### Incentives To Improve Productivity in Other Areas

The working group also addressed the applicability of incentives to other areas by defining the concept of modernization efficiency projects to enhance productivity through projects that are not capital intensive. The group believed that MEPs could still be distinguished from programs such as Value Engineering or Design-to-Cost because MEPs emphasize improvement through productivity enhancement rather than through changes in product specifications as is the case with the other two programs.

IMIP incentives are already being used to achieve cost reduction in areas such as inventory management and general overhead costs. Although IMIP policy provides for noncapital intensive projects (MEPs), it is worth noting that even in areas such as inventory management, it is *capital equipment* (e.g., a computerized stock control and distribution system) that is likely to achieve cost reductions. To the extent that the focus of IMIP shifts measurably from capital investment to other areas, increasingly rigorous cost tracking and verification systems will be required to distinguish it from programs such as Value Engineering.

#### 4. RECOMMENDATIONS

The findings of the test and the conclusions drawn from them lead us to make the following recommendations to help IMIP realize its full potential to substantially reduce DoD acquisition costs.

First, the DoD policy and program implementation should emphasize that *cost reduction through capital investment* is the primary objective of the IMIP. DoD should emphasize that while collateral benefits such as enhanced production surge and mobilization potential are desirable, the primary objective of IMIP is to cut DoD's acquisition costs by overcoming existing disincentives to productivity-enhancing investments.

Second, DoD policy and program implementation should limit the program to cases where price competition is not feasible. IMIP is necessary where the full effect of market forces cannot be brought to bear to motivate cost-reducing investment. DoD negotiators should try to develop simplified approaches to contractual implementation to minimize the administrative burdens of the program. By carefully evaluating the financial effects of a proposed contract and exploring the possible interaction of IMIP incentives with other contractual incentives, DoD negotiators should reach agreements that reward the contractor only for benefits actually achieved, or provide modest rewards for expected benefits where detailed tracking and verification are not going to be required.

Finally, DoD contracting officers and other negotiators should continue using the DCF model developed during the test as the financial analysis tool to support the drafting of shared savings agreements. The Assistant Secretary of Defense (Acquisition and Logistics) should appoint a Military Service as executive agent to maintain the model so that it reflects current DoD contract pricing and Federal tax policy. This executive agent should also provide technical assistance to model users.

APPENDIX A  
CHARTER  
TEST OF THE  
INDUSTRIAL MODERNIZATION INCENTIVES PROGRAM (IMIP)

Background

DAR 3-815 presently describes a procedure for the government to accept certain risks of program failure (termination or severe reduction) in order to encourage contractor investment in severable plant equipment to reduce DoD acquisition costs. Other sections of the DAR also provide for the recognition of costs and the negotiation of profit in a fashion intended to encourage contractor investment in facilities necessary for the efficient production of defense equipment. An identified disincentive to contractor investment, however, is the policy and practice of pricing contracts on the basis of costs expected to be incurred--any significant reduction in costs of performance will cause a related reduction in negotiated profits. Thus a mechanism must be found to permit contractors to benefit from their cost reduction efforts. In addition, the present application of DAR 3-815 to only severable plant equipment further diminishes DoD's ability to encourage contractor investment in necessary capital assets.

Objective

While recognizing that DAR coverage requires changes, the DoD is not yet in a position to propose the exact nature of the changes required. The test is being initiated with the objective being to develop and submit specific recommendations for changes to the DAR and improvements to IMIP policy. At the completion of the test program, a formal DoD IMIP instruction will be issued.

Documentation

The draft DoD Instruction 5000.XX, "Industrial Modernization Incentives Program," draft clauses developed by the Tri-Service Committee and the draft DoD Guide "Improving Productivity in Defense Contracting" are key documents to be evaluated during the test. This documentation will be separately circulated and made available to appropriate government and industry personnel. The documents are dynamic and may be modified as necessary during conduct of the test program. In addition, new clauses may be developed based on the circumstances of the acquisitions concerned.

Test Program Structure

A. Steering Group

A Steering Group will be formed to monitor the conduct and results of the test program (considering lessons learned on Services' Technology Modernization and Industrial Productivity Improvement Programs now in progress), and provide appropriate recommendations to the DoD Components (the Services and DLA). They should define the time and scope of the test effort, have visibility over DoD Component-developed plans for the program, assist in preparing the Memorandum of Understanding for

IMIPs where more than one DoD Component is involved, and address issues such as funding and monitoring contingent liabilities as they occur. They shall have oversight responsibility for DAR deviations during the test program (see Authority paragraph below), and will ensure appropriate Congressional notification and liaison occurs. The Steering Group should evaluate the success of the various incentives and overall program. They should provide recommendations for DAR changes and IMIP policy improvements based on comments received and experience gained during the test period.

#### B. Support Team

To ensure IMIP implementation and to support the Steering Group, each DoD Component should establish (and provide requisite funding support for) an IMIP Support Team. The team should be composed of top-flight, experienced personnel in contracts, manufacturing, productivity, finance-budget, and legal matters to provide assistance to program and acquisition managers and to industry. The IMIP Support Team should assist in conducting seminars and training. They should draft, review, and implement DoD Component IMIP instructions for contracting, technical, and financial matters; provide the focal point for coordination with other DoD Components for joint IMIPs; act as a repository for data collection including reporting of IMIP progress and results; and provide other support, as required.

#### C. Decentralization

The test program will be decentralized allowing each of the DoD Components to pursue incentives which they feel will best encourage productivity enhancing, contractor capital investments. It must be recognized, however, that a convergence of techniques and procedures will be required in the ultimate formulation of an overall DoD approach and policy. Accordingly, the DoD Components should work closely with each other and with the Steering Group to share information and ideas throughout the conduct of the test program.

#### Authority

For the conduct of this test program, the DoD Components are authorized a blanket waiver to DAR 1-108 and 1-109 which outline the usual procedures for obtaining DAR deviations. Instead, the controls established in this charter are to be used to prototype specific capital investment incentive changes, consistent with current legislative requirements, and to field test changes agreed upon. In this regard, Head of Contracting Activity (HCA) approval should be obtained when specific deviations are required. The HCA will keep the Steering Group apprised of all deviations granted. Steering Group approval will be required for all deviations which affect more than one contract. Requests for deviations will be submitted in DAR case format. Deputy Under Secretary of Defense (Acquisition Management) approval will be required on requests for deviations which involve major policy issues in areas other than capital investment incentives (i.e., patent policy). The OSD representative on the Steering Group will keep

the Deputy Under Secretary of Defense (Acquisition Management) apprised of all deviation activity. Copies of all deviations granted will be provided to the DAR Council. The fiscal authority who commits funds to any resultant contract must comply, however, with DAR 3-815(d)(2)(ii) in assuring high-level approval of contingent liabilities is obtained and in notifying Congress in advance of the use of this technique, when applicable. In addition, notification to the Assistant Secretary of Defense (Comptroller) and the Under Secretary of Defense (Research and Engineering) will be required prior to contract signatures, on any contract which establishes a liability of ten million dollars or more, which is contingent upon future production.

#### Limitations

Incentives and procedures employed during this test must be consistent with current legislative requirements.

Capital investment incentives which provide contractor investment (termination) protection through a contingent liability guarantee for real property may be used on a limited basis. The incentive shall be structured so as to provide a disposal procedure such that government need not take title to real property in the event of contract termination or cancellation. Liaison with key congressional subcommittees will be required. Proposed rules on contingent liabilities and boundaries for the test should be established prior to the liaison.

Clauses tested must be consistent with Cost Accounting Standards.

#### Test Conditions

Under the test, contractors will have the opportunity to share in the government's savings through the use of sharing arrangements on a percentage basis, through a return on investment (ROI) approach, or through other appropriate approaches. In addition, the government's assumption of risk for program failure would not be limited to severable plant equipment and could include investments made for non-severable assets, provided appropriate approvals are received.

Programs selected by the DoD Components to participate in the test will be based on a number of factors including high potential for substantial savings and other factors as described in proposed DoD Instruction 5000.XX. Test conditions will be under the purview of the Steering Group.

Contractor proposals should be encouraged based on established criteria, such as (1) the investment will not be made but for the government's agreement to share benefits and accept certain risks; (2) there is a reasonable expectation that adoption of the proposal will result in a substantial savings to the government through lower unit production cost or that other benefits as stated in proposed DoD Instruction 5000.XX will result; (3) there is a reasonable expectation

that funds will be available to procure the projected quantities; (4) the investment should primarily support enhanced production efficiency of an existing or anticipated operation, not new production capacity; and (5) the investment will have desirable benefits in other areas such as industrial preparedness.

Contractor proposals should contain an identification of assets to be acquired by the contractor; identification of items they will be used to produce; a description of the difference between the contractor's production methods with and without the proposed investment; detailed cost estimates for the existing contract requirements and the proposal (including a realistic assessment of the effects on direct and indirect costs, implementation costs, etc.); an analysis of effects of learning, variations of quantities, changes to make-or-buy plans, subcontracting, labor contract agreements, and other similar factors; and a suggested business arrangement describing government and contractor benefit sharing over existing and future contracts and the time frame for acceptance of the proposal.

#### Issues to be Considered

The following are examples of issues to be considered during the conduct of the test program. Maximum use will be made of existing experience in Technology Modernization and Industrial Productivity Improvement Programs. The issues are subject to revision and refinement by the Steering Group.

- o Development of different incentives appropriate for various contractual situations; i.e., contract size (large and small contracts), contract types (fixed price vs. cost), and degree of competition.
- o Ways to ensure incentive provisions can be successfully employed to encourage investments by subcontractors and vendors.
- o Application of incentives to other than single contracts, such as when numerous DoD Component contracts and different DoD Component contracting activities deal with a single contractor.
- o The manner in which incentive clauses can be applied to non-severable assets and real property.
- o Verifiable evaluation criteria for measuring contract performance including validating cost savings and other benefits.
- o Assessment on how the use of these incentives affects competition. (Does DoD provide an undue competitive advantage to selected contractors? Can competitive solicitations be structured to permit alternative proposals based on use of these incentives?)

- o Determination if unit production prices to DoD in acquisition programs will measurably decrease through the use of these incentives.
- o Evaluation of whether contractor investment in capital assets (facilities, equipment, and associated data or computer software) needed for the defense industrial base increase through the use of these incentives.
- o Determination of how the increased production efficiency aspects of proposals can be separated from possible increased production capacity for proper evaluation.
- o Assessment of the unintended or unforeseen effects of the utilization of these provisions.
- o Relationship between the Weighted Guidelines (DAR 3-808.2) and the new incentives. What changes and adjustments, if any, will be necessary to the Weighted Guidelines?
- o Combination of contractor investment protection and shared saving type incentives, and their interaction with other incentives such as Value Engineering and Design-to-Cost.
- o Identification of incentives to improve productivity in areas other than through capital investment (e.g., human resources, overhead, inventory, and product design).
- o Candid evaluation of the success of various incentives and the overall program.

## APPENDIX B

### CALCULATION OF PERFORMANCE INCENTIVES, F-16 PROGRAM

The mathematical approach to calculating the amount of General Dynamics' performance incentive for the first category, timely implementation, can be illustrated using the examples of Capital Acquisition Requests 81-1 and 82-1. In order to determine how much General Dynamics may earn, semiannual reports are kept on schedule compliance. Any equipment in place on time is eligible for the full incentive; any equipment late, but by 3 months or less is eligible for 50 percent of the incentive. If General Dynamics can prove that late equipment implementation occurs for reasons beyond its control and the contracting officer accepts the proof, a schedule modification can be negotiated. The acquisition value of the equipment is the weighting factor for the calculation such that:

$$\frac{(\$ \text{ Value on or Ahead of Schedule}) + 0.5(\$ \text{ Value Within 3 Months})}{\text{Total \$ Value of Planned Equipment}} \times 0.3 (\text{Total Incentive})$$

= \$ Value of Performance Incentive Payment for Facility Implementation to Schedule.

For the second category, Technology Implementation to Schedule, General Dynamics also has an opportunity to earn up to 30 percent of the incentive. These technology projects are grouped into six subcategories, each of which has different criteria for measuring "on-time" performance in its implementation. These six subcategories and their measures of timely implementation are:

- (a) *Hardware Developments* - Projects demonstrating a workable design and prototype piece of production equipment and, in addition, completing the necessary in-house tasks of (1) computing a final cost-benefit analysis and (2) preparing the required facility specification documentation will be considered implemented when the above conditions are met.
- (b) *Software or System Developments* - Projects dealing primarily with systems developments or software-to-machine (CAM) interfaces will be considered completed upon submittal of Phase V Production System Support and Maintenance documents (defined by 16PP344 - reference Contract F33657-80-G-0007).



- (c) *Tooling Developments* – Projects investigating tooling upgrades and/or improved tooling systems and controls will be considered implemented when the first production tools are released by the General Dynamics shop.
- (d) *Methods and/or Prices Developments* – Projects that result in improvements will be considered implemented when the appropriate change has been incorporated into computerized planning documentation and when final report documentation is submitted.
- (e) *Math Models and Simulation Developments* – Projects will be considered implemented upon submittal of project final reports.
- (f) *Facility Modification* – Projects that focus on the application of new sensor controls or the development of modified monitoring and control systems on existing equipment will be considered implemented upon completion of the General Dynamics Release-for-Production-Use form.

General Dynamics is also eligible for 50 percent of the incentive for any project that is late by 6 months or less. The formula for calculating the applicable incentive is:

$$\frac{(\$ \text{ Value on or Ahead of Schedule}) + 0.5 (\$ \text{ Value Within 6 Months})}{\text{Total } \$ \text{ Value of Planned Developments}} \times 0.3 (\text{Total Incentive})$$

= \$ Value of Performance Incentive Payment.

Achievement of estimated direct labor savings could earn General Dynamics the remaining 40 percent of the total available incentive. The method for calculating this portion of the incentive is somewhat more complicated than that used for the other two portions. According to the contract:

The calculation of incentives earned will be based on the results of items assessed. Experience has shown that to ensure accurate cost trends data, an appropriate time for performing an assessment is 15 months after the item's on-line date. The percent of savings assessed compared to the estimated man-hour savings for the assessed items will yield a factor. This factor will be applied to the total unmeasured man-hour savings to yield the factored savings. Thus, the amount of earned incentives will be calculated for assessed items and factored for all unmeasured items.

To calculate the savings, the total number of items for review is identified and the total man-hour savings associated with those items is estimated. Of the total items, some portion is designated to be assessed, and a man-hour savings estimate is made for the assessed items. The total performance incentive available for the assessed items is computed as follows:

$$0.4(\text{Total Incentive}) \times \frac{\text{Estimated Man - Hours Savings for Assessed Items}}{\text{Total Estimated Man - Hour Savings}}$$

= \$ Value of Incentive Available for Assessed Items.

The calculation of the amount of the actual award for assessed item man-hour savings is as follows:

$$\frac{\text{Actual Man - Hours Saved for Assessed Item}}{\text{Estimated Man - Hour Savings for Assessed Items}} \times \$ \text{ Value of Incentive Available for Assessed Items}$$

= \$ Value of Performance Incentive for Assessed Items.

The ratio of actual to estimated man-hour savings provides part of the basis for the factor approach for calculating the performance incentive available for the items for which exact cost is not being calculated. The amount of the incentive available for unmeasured items is calculated as follows:

$$\frac{\text{Estimated Man - Hour Savings for Unmeasured Items}}{\text{Total Estimated Man - Hour Savings}} \times 0.4(\text{Total Incentive})$$

= \$ Value of Incentive for Unmeasured Items.

This equation indicates that to determine how much incentive General Dynamics can actually earn, the number of unmeasured or unassessed items on-line at the time of consideration is divided by the total number of unmeasured items; the result of that calculation is multiplied by the dollar value of the incentive for unmeasured items; and the product is then multiplied by the result of dividing the Actual Man-Hours Saved for Assessed Items by the Estimated Man-Hours Saved for Assessed Items. The result of this multiplication is the dollar value of the incentive for which General Dynamics is eligible from the achievement of man-hour savings on the unassessed items.

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